Claims

1. A screening method for compounds having a modulating effect on cellular development and/or cell differentiation and/or cellular processes, said method comprising the following steps:

a) cultivating cells harboring a promoter-reporter construct in a 3D micro-culture under conditions mimicking the natural *in vivo* environment (3D tissue-like conditions) of said cells, or cultivating said cell in a 2D culture on bioinductive material,

b) contacting said cells with a test compound and comparing the read-out of the promoter-reporter construct to a control.

2. The method of claim 1, wherein said 3D tissue-like conditions comprise either 3D aggregated cells, cultivated under high cellular density only, and/or cells cultivated with natural or synthetic scaffold/biomaterial.

3. The method of claim 2, wherein said scaffolds/biomaterials are a biomaterial substrate or scaffold that promotes normal physiological activity, in particular scaffolds/biomaterials selected from the group of natural scaffolds/biomaterials consisting of alginate, agarose, hyaluronic acid, collagen, proteoglycan and mixtures thereof, or from the group of synthetic scaffolds/biomaterials consisting of Skelite™, polyHEMA, polyglycolic acid (PGA), polylactic acid (PLA) and mixtures of PGA and PLA.

4. The screening method of anyone of claims 1 to 3, wherein said cells are derived from healthy or pathological musculoskeletal tissues or precursor cells being able to differentiate and form *de novo* musculoskeletal tissue, preferably said cells stem from humans.

5. The method of claim 4, wherein said tissue is selected from the group consisting of chondrocytes, bone cells, rheumatoid cells, osteoarthritic chondro-

cytes, stem cells, mesenchymal cells, cartilage or bone tumor cells.

6. The screening method of anyone of claims 1 to 5, wherein said promoter is selected from the group consisting of human COL1, COL2, SOX9, COMP, MMP2, and aggrecanase-1 (ADAMTS4).

7. The screening method of anyone of claims 1 to 6, wherein said reporter is selected from the group of GFP, luciferase, β-galactosidase, chloramphenicol acetyltransferase gene (CAT).

8. The screening method of anyone of claims 1 to 7, wherein said cells stem from humans and said promoter-reporter construct comprises a reporter gene under control of a human promoter wherein said promoter is selected from the group consisting of human COL1, human COL2, human SOX9, human COMP, human MMP2, and human aggrecanase-1 (ADAMTS4) and said reporter gene encodes a protein with an activity that can be detected by colorimetric or fluorescent methods, in particular said reporter is selected from the group consisting of GFP, luciferase, β-galactosidase, chloramphenicol acetyltransferase gene (CAT).

9. The screening method of anyone of claims 1 to 8, wherein said cells comprise more than one promoter-reporter construct.

10. The screening method of anyone of claims 1 to 9, wherein said test compounds are selected from the group consisting of chemical libraries, natural product libraries, peptide libraries, cDNA libraries and combinatorial libraries.

11. The screening method of anyone of claims 1 to 10, wherein said method is performed in a multiplate culture format e.g. 96 or 384-mulitwells.

12. The screening method of claim 11, wherein the 3D micro cultures are produced in an automated fashion e.g. by robotic system.

13. The screening method of anyone of claims 1 to 12, wherein said cells are contacted with an activator or suppressor of said promoter and with a test compound.

14. The screening method of anyone of claims 1 to 13, wherein said method is used as a quality control tool to assess the chondrogenic potential of isolated cells prior to implantation within cell-based therapies.

15. The screening method of anyone of claims 1 to 13, wherein said method is used as a quality control tool to assess a process producing *in vitro* tissue-engineered cartilage constructs usable for treatment of cartilage defects.

16. The screening method of anyone of claims 1 to 13, wherein said method is used as a tool to assess the cell potency and such the suitability of cells for cell therapy and/or tissue engineered therapy.

17. Use of a promoter-reporter construct wherein said reporter is selected from the group consisting of GFP, luciferase, β-galactosidase, chloramphenicol acetyltransferase gene (CAT) and said promoter is selected from the group consisting of COL1, COL2, SOX9, COMP, MMP2, and aggrecanase-1 (ADAMTS4), for the construction of transgenic animals, preferably transgenic mice.

18. A transgenic animal comprising a promoter-reporter construct, wherein said construct comprises a reporter selected form the group consisting of GFP, luciferase, β-galactosidase, chloramphenicol acetyltransferase gene (CAT) and a promoter selected from the group consisting of COL1, COL2, SOX9, COMP, MMP2 and aggrecanase-1 (ADAMTS4).

19. A cell line derived from the transgenic animal of claim 18.

20. Use of the transgenic animal of claim 18 or the cell line of claim 19 in a screening method for screening compounds having a modulating effect on cellu-

lar development and/or cell differentiation and/or cellular processes.

21. A DNA construct for cell transfection comprising a reporter gene under control of a human promoter wherein said promoter is selected from the group consisting of human COL1, human COL2, human SOX9, human COMP, human MMP2, and human aggrecanase-1 (ADAMTS4) and said reporter gene encodes a protein with an activity that can be detected by colorimetric or fluorescent methods.

22. The DNA construct of claim 21, wherein said reporter is selected from the group consisting of GFP, luciferase, β-galactosidase, chloramphenicol acetyltransferase gene (CAT).

23. A cell comprising a reporter construct of claim 21 or 22.

24. A cell line comprising a reporter construct of claim 21 or 22.

25. The cell or cell line of claim 23 or 24, wherein said cells are derived from healthy or pathological musculoskeletal tissues or precursor cells being able to differentiate and form *de novo* musculoskeletal tissue, preferably said cells stem from humans.

26. The cell or cell line of claim 25, wherein said cells are selected from the group consisting of chondrocytes, bone cells, rheumatoid cells, osteoarthritic chondrocytes, stem cells, mesenchymal cells, cartilage or bone tumor cells.

27. Use of a cell of anyone of claims 23, 25 or 26 or a cell line of anyone of claims 24 to 26 in a cellular screening assay.

28. Use of a cell of anyone of claims 23, 25 or 26 for the *in vitro* formation of tissue, preferably cartilage tissue.

29. A method for testing whether a material has bioinductive characteristics, said method comprising the following steps:

culturing cells harboring a promoter-reporter construct on the material to be tested and

comparing the read-out of the promoter-reporter construct to a control.

30. The method of claim 29, wherein said cells are human cells, preferably cells as defined in claim 4 or 5.

31. The method of claim 29 or 30, wherein said reporter is selected from the group defined in claim 7 and the promoter is selected from the group defined in claim 6.

32. A method for testing whether a biomaterial is degraded or resorbed *in vivo* or *in vitro*, said method comprising the following steps:

culturing cells harboring a promoter-reporter construct on the material to be tested and

monitoring expression of the reporter gene in said cells.

33. The method of claim 32, wherein said cells are human cells, preferably cells as defined in claim 4 or 5.

34. The method of claim 32 or 33, wherein said reporter is selected from the group defined in claim 7 and the promoter is selected from the group defined in claim 6.

35. A method for the quality control of cells cultivated *in vitro* comprising:

transfecting cells that have been cultured *in vitro* with a key marker promoter-reporter construct and cultivating said transfected cells in a 3D culture and

detection of the reporter read-out which is indicative for differentiated cells.

36. The method of claim 35, wherein said cells are selected from the group defined in claim 4 or 5, the promoter is selected from the group defined in claim 7 and the promoter is selected from the group defined in claim 6.